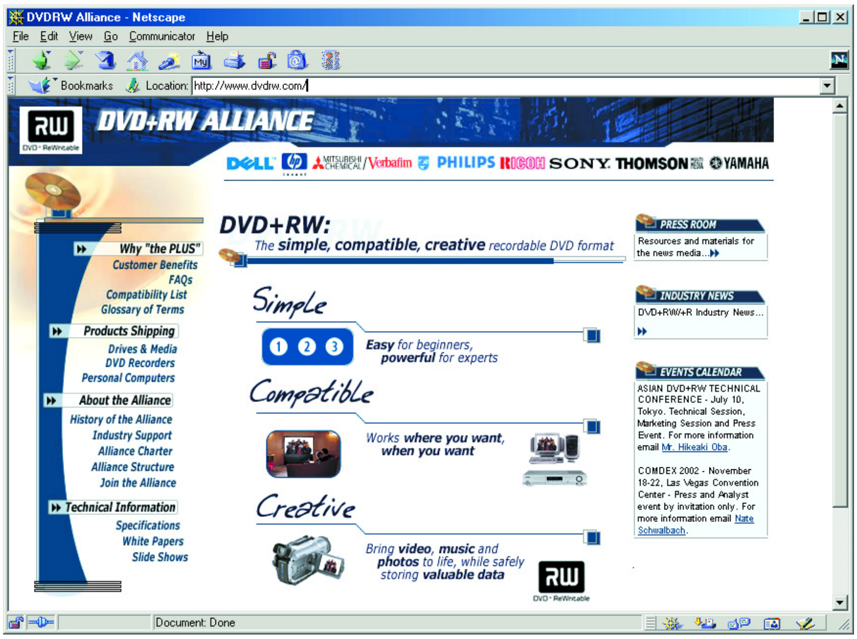
Battle of the DVD Standards

DVD-RW versus DVD+RW

By Harry Baggen

DVD burners are here to stay and we can reasonably expect them to supersede CD-burners in PCs before long. After all, a DVD can hold 4.7 GBytes yes that's seven times the amount of data you can cram on a CD-ROM. About 10 manufacturers are shipping models already, with prices coming down quickly from the £300 mark. There's one niggling problem, though: some bickering has arisen over a common standard to be adopted.



ASIAN DVD+RW TECHNICAL CONFERENCE - July 10, Tokyo. Technical Session, Marketing Session and Press Event. For more information email Mr. Hikeaki Oba.

COMDEX 2002 - November 18-22, Las Vegas Convention Center - Press and Analyst event by invitation only. For more information email Nate Schwalbach.

During the past two years or so, the DVD has become popular as a replacement for the pre-recorded VHS tape. A glut of popular films and concerts is currently available on DVD from the high street stores offering superb image and (surround-) sound quality. This has become possible thanks to the DVD's huge storage capacity of 4.7 Gigabytes per layer.

With the DVD a resounding success and embraced by the public, the next logical step is, of course, the recordable DVD. In 1997, the first DVD recorders were introduced, at then astronomical prices. Since then, prices have come down to consumer (= more acceptable) levels and an internal DVD burner can now be bought for just under 300 pounds. Prices of media (i.e., blank DVD disks) are between 3 and 9 pounds each. So what, you may ask, deters us from buying one of these mass storage devices, just for data or perhaps even to record the family's holiday videos in MPEG2 format? Nothing, or…?

Things are never as easy as they seem at first glance. Just as various standards marked the introduction of video cassette tapes for the consumer and semi-professional market, there are now two competing DVD camps. One consists of a couple of manufacturers complying with the only official standard released for the recordable DVD medium. This standard is available at the **DVD Forum** [1] which sets all the important DVD formats, including DVD-RW and DVD-R, where the suffix 'RW' indicates read/write (i.e., erasable), and 'R' read only (i.e., write once), just as with CD-ROMs. Pioneer and Matsushita (Panasonic) are the main names in this group and they follow suit by producing DVD burners to this standard.

Last year, however, a number of large manufacturers launched a new DVD standard marked b a plus sign: DVD+RW and DVD+R. The plus indicates certain advantages over the 'minus' format, including (claimed) better compatibility with existing DVD players and drives, and suitability for video as well as data. Besides, a few additional, attractive, features have been included. For example, this standard allows the user to choose between constant linear velocity (CLV as with ordinary CD-ROMs) and constant angular velocity (CAV) when burning a DVD, CAV enabling faster access times to be achieved for data use. Other features include 'defect management' for higher reliability and 'quick formatting' to save time if you want to use a blank disc straight away. For video use, 'lossless linking' is available to make the system compatible with variable bit rates.

In the 'plus' camp we find almost all big guns like Philips, Sony, HP, Yamaha, Ricoh and Dell. They are united under the name **DVD+RW Alliance** [2]. An equally interesting, though unofficial, site is called **DVD-plusRW** [3], it contains lots of news and information from the 'plus camp. As a remarkable detail, most of these manufacturers are also a member of the DVD Forum, but have failed so far to push this format to the status of 'standard'.

The upshot is that two different types of DVD burners are currently found on the market, each using their own media and refusing to take that of the competition as far as writing is concerned.

If you want to know more about the technical aspects of the two rivalling formats, have a look at the **White Papers** of the DVD Alliance [4] and Pioneer's **DVD Technical Guide** [5] (on DVD RW of course).

As far as compatibility is concerned, the two formats are near equal performers. Although DVD+ claims better compatibility, several tests run by computer magazines indicate about equal performance of 'plus' and 'minus'. DVD-R and DVD+R discs seem to be accepted by nearly all modern drives and players. Worse results are generally obtained from rewritable DVDs. An extensive compatibility overview is available on the web at **VCDHelp** [6].

Who will win the market for DVD burners? Since the 'plus' format is supported by all the big names in the industry, it seems to stand a fair chance of success. The 'minus' supporters are a minority and that may turn out to be a significant disadvantage (reminiscences of Sony's lonely battle for its Betamax system). Microsoft has shown an interest in the DVD+ format and intends to offer support for it in future versions of Windows. That could well be the decisive factor.

Until then, consumers will have to decide: is it going to be a 'plus' or a 'minus' DVD burner?

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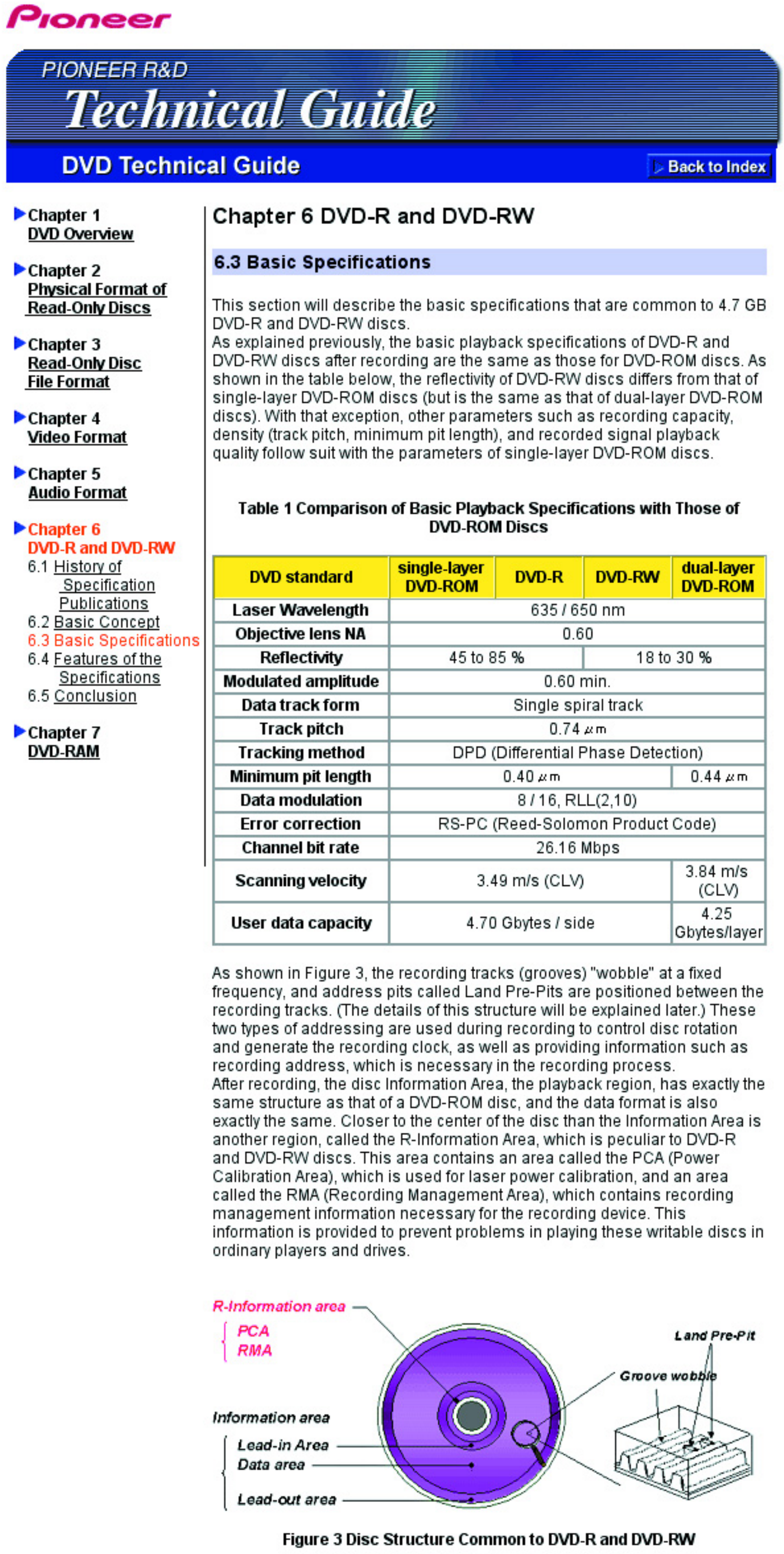

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Chapter 6 DVD-R and DVD-RW

6.3 Basic Specifications

This section will describe the basic specifications that are common to 4.7 GB DVD-R and DVD-RW discs.
As explained previously, the basic playback specifications of DVD-R and DVD-RW discs after recording are the same as those for DVD-ROM discs. As shown in the table below, the reflectivity of DVD-RW discs differs from that of single-layer DVD-ROM discs (but is the same as that of dual-layer DVD-ROM discs). With that exception, other parameters such as recording capacity, density (track pitch, minimum pit length), and recorded signal playback quality follow suit with the parameters of single-layer DVD-ROM discs.

Table 1 Comparison of Basic Playback Specifications with Those of DVD-ROM Discs

DVD standard	single-layer DVD-ROM	DVD-R	DVD-RW	dual-layer DVD-ROM
Laser Wavelength	635 / 650 nm			
Objective lens NA	0.60			
Reflectivity	45 to 85 %		18 to 30 %	
Modulated amplitude	0.60 min.			
Data track form	Single spiral track			
Track pitch	0.74 µm			
Tracking method	DPD (Differential Phase Detection)			
Minimum pit length	0.40 µm			0.44 µm
Data modulation	8 / 16, RLL(2,10)			
Error correction	RS-PC (Reed-Solomon Product Code)			
Channel bit rate	26.16 Mbps			
Scanning velocity	3.49 m/s (CLV)			3.84 m/s (CLV)
User data capacity	4.70 Gbytes / side			4.25 Gbytes/layer

As shown in Figure 3, the recording tracks (grooves) "wobble" at a fixed frequency, and address pits called Land Pre-Pits are positioned between the recording tracks. (The details of this structure will be explained later.) These two types of addressing are used during recording to control disc rotation and generate the recording clock, as well as providing information such as recording address, which is necessary in the recording process.
After recording, the disc Information Area, the playback region, has exactly the same structure as that of a DVD-ROM disc, and the data format is also exactly the same. Closer to the center of the disc than the Information Area is another region, called the R-Information Area, which is peculiar to DVD-R and DVD-RW discs. This area contains an area called the PCA (Power Calibration Area), which is used for laser power calibration, and an area called the RMA (Recording Management Area), which contains recording management information necessary for the recording device. This information is provided to prevent problems in playing these writable discs in ordinary players and drives.

Figure 3 Disc Structure Common to DVD-R and DVD-RW

Internet addressses

[1] www.dvdforum.com/forum.shtml
[2] www.dvdrw.com/
[3] www.dvdplusrw.org/
[4] www.dvdrw.com/whitepapers.html
[5] www.pioneer.co.jp/crdl/tech/dvd/6-3-e.html
[6] www.vcdhelp.com/dvdplayers.php